PARTNERSHIPS for SUSTAINABLE DEVELOPMENT

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Inside this issue:

Partnerships Fair:Identifying New Technologies for Sustainable Development in Small Island Developing States	1
Gratitude and Feedback	5
Information Desks Tuesday May 8	5

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Identifying New Technologies for Sustainable Development in Small Island Developing States

Ms. Diane Quarless and Ambassador Angus Friday open the session on Identifying New Technologies for Sustainable Development in SIDS

Ms. Diane Quarless, Chief of the Small Island Developing States (SIDS) Unit of UN/DESA/DSD, opened the discussion by explaining the objectives of the session, which aimed to introduce an array of new technologies to promote development in SIDS and other countries. She added that this partnership was the epitome of bringing together scientists, with the volunteerism of NGOs, the drive of the private sector and the support of the UN and donor community.

Ambassador Angus Friday of the Mission of Grenada to the United Nations, Chairman of the Association of Small Island States (AOSIS) welcomed the participants and said he was encouraged by the levels of interest in working with SIDS. He emphasized the increasing pressures for quick action for development in SIDS and said that partnerships are the key to achieving results. Ambassador Friday also highlighted the steps needed for greater implementation and replication of successful pilot projects and invited participants to work together to secure financing as well as establish an interactive learning network to share best practices across a widely spread geographic area. He thanked participants for their attendance and encouraged them to return next year to share the results of their work.

Dr. Tom Goreau introduced his work by describing his non-profit work primarily on coral reef restoration. He explained that around the world today there is more dead coral than live coral, largely due to the slight increase in water temperatures which is already occurring, but also due to water pollution from sewage and other sources. He has developed a technology, which he calls Biorock, which has proven highly effective in regenerating coral reefs. The technology consists of a metal frame of any shape, normally of re-bar, placed in the ocean floor, with a gentle electric current passed through it. Within days in this environment, any rust on the metal disappears and limestone begins to form on the metal. The coral can be generated by attaching small pieces of dying coral to the Biorock frame. He showed several photos of the results of the process, where within a year, large coral had grown, and by the end of three years there were full coral reefs, filled with schools of fish. He added that the frame can be customized to favour the environment for particular species of fish or lobster, using any form of

continued on Page 2

Identifying New Technologies for Sustainable Development in Small Island Developing States (cont.)

continued from Page 1

Dr. Goreau demonstrates the results of Biorock technology on fish stocks, coral reefs and shoreline protection.

electrical current from sources such as solar, tidal or wind.

The results, Dr. Goreau indicated, can be dramatic for ecotourism, a driving force of development in SIDS, because hotels can build beautiful, well-stocked coral reefs on their own beaches. He added that by using the Biorock process, the survival rate for coral has been found to be 16-50 times higher than for adjacent natural coral. Dr. Goreau went on to explain that the capacity to regenerate coral reefs can be extremely important for the restoration of depleting fish stocks around the world and for the protection of shorelines. Dr. Goreau concluded by saying that is it time for the Neolithic revolution to reach the seas, where humans can begin to manage coastlines to restore fisheries.

Mr. Erik Hagberg, CEO of PAC International, a sea cucumber aquaculture company, opened his presentation by stressing the important role that partnerships play as an effective way to fill the void of solutions for development. He explained the mission statement of PAC, which is to empower adaptation and to improve the environment in SIDS, requiring solid technologies and sustainable financing. He explained that PAC has developed a cooperative business model to address the financing issues as well as working with the SIDS partnership to identify appropriate technologies.

The PAC solution, Mr. Hagberg explained is to involve entire atoll communities in a cooperative sea cucumber farm. Sea cucumbers, he added, are highly valuable commodities in Asia, known to be very high in protein and with potential antibacterial and antiviral health benefits for arthritis and other ailments. Mr. Hagberg outlined the proposed ownership structure for the sea cucumber farms, where local communities would be shareholders in the company. He added that the corporate cooperative is a good model for SIDS particularly in places with traditional communal property rights. In the Marshall Islands, Mr. Hagberg explained, the municipal governments and customary leaders have pledged six atolls to the company under the cooperative leadership structure. He added that the co-ownership structure provides community members with the incentive to make the operation sustainable. In the short term, Mr. Hagberg explained, the project will create jobs and provide supplemental earnings for entire communities, while in the longer term, the employee stock ownership program can increase the economic security and families will be able to create the assets to invest in their future.

Mr. Hagberg anticipated that within one year, the community can begin to harvest with an excellent profit and within five years there would be a local CEO for the atoll farms. He emphasized the importance of incorporating local knowledge of the sea cucumber's habitat, and of the use of traditional canoes which are not affected by rising fuels costs. He added that with a rotating harvest from around the island, the stock can be raised in a sustainable and inexpensive way, without the requirement of nets, fences or added food supplies.

Mr. Hagberg explains the benefits of the PAC cooperative model for sustainable sea cucumber farming.

Mr. Roger Bason, president of Natural Currents, opened his remarks by describing his company, a renewable energy business, working in tidal energy and small scale hydro technologies, such as water wheels that have been used for millennia.

Mr. Roger Bason and Dr. Scott Anderson outline the opportunities to harness tidal energy for SIDS

Mr. Bason explained that if less than 1% of the world's renewable energy sources could be converted to electricity, it would satisfy the current global energy demands five times over. He explained that tidal energy is a highly predictable source of renewable energy because it is generated from the free flow of tides as influenced by the moon, the sun and other celestial bodies. He outlined other benefits and characteristics of tidal energy such as the fact that it creates no pollution, does not require fuel, does not interfere with fish or local habitat, is cost effective at a rate of approximately $2500/kw, and generates electricity at a rate of about 6.1 cents per kwh. This rate, he explained, compares favourably with wind and solar energy, and has the

continued on Page 3

Identifying New Technologies for Sustainable Development in Small Island Developing States (cont.)

continued from Page 2

advantage of being a more highly predictable source of energy. Mr. Bason identified several designs and types of tidal energy turbines, from some that sit on the ocean floor to others that float or are installed mid-stream.

He discussed a project underway with the City of New York for a hybrid solar, wind, and tidal project along the East River. He also showed images of examples of ideal sites for tidal projects located in man-made and natural channels in SIDS. He explained that taking advantage of the natural currents that exist in these channels can be a cost-effective way of generating electricity for SIDS.

Mr. Bo Linton explains how liquid wastes can be converted to bio-energy

Dr. Scott Anderson, coordinator for a tidal energy project in the Amazon, presented an introduction to assessing the potential for small-scale tidal energy projects in SIDS. He provided a practical overview of the conditions necessary for cost effective tidal energy projects. He indicated that the technology can be applied to tides or to a fast-moving current in a river, using an inexpensive helical turbine.

The design of the turbine, Dr. Anderson explained, is simple and could be built for less than $1000, with 6 imported turbine blades ($100 each) and using local skills and materials for the turbine frame. He added that the basic turbine system generates enough electricity for 10 rural households to have a few lights and a television. He emphasized the importance of including local materials and labour, to keep costs to a minimum, but also to ensure the sustainability of operations and repairs.

Dr. Anderson outlined two major considerations for site location for tidal energy projects: the distance from the users (energy stored in batteries does not travel well or last long), and the rate of the water (the faster the better). He noted that the best sites were either close to users or easily accessible by boat or road. He explained that using only a bottle, a rope, a measuring tape and a digital watch, tide potential can be assessed very inexpensively, taking measurements for 13 days over a period of 3 months. He encouraged participants to avoid high consulting fees and to conduct their own pre-feasibility of sites, given the simplicity of the technology.

Mr. Bo Linton, representing Magnegas, presented the Plasma Arc Flow technology to convert liquid sewage waste into energy. He explained that raw sewage is being dumped into the ocean in many places all over the world with its devastating impact in reducing fish stocks, killing coral reefs, and affecting tourism. He added that conventional water treatment is very expensive and is generally not available in remote areas.

Mr. Linton explained that using the Plasma Arc Flow technology, liquid wastes can be converted into clean water, energy and organic fertilizer, in a system where a combination of heat (10,000 degrees F), electric current and UV rays 'bake' waste materials in suspension into sterilized water. He added that the system produces a valuable fuel they have called Magnegas, which burns more cleanly than any other bio-fuel, and can be readily used for transportation. He provided a brief history of the technology that was created by an MIT scientist over the last 20 years and is now ready for deployment. For a city of 45,000 people, the system has lower operating costs, is half the price to construct, and requires

Mr. Jeff Rose explains how the Fully Belly Project can help to provide nutrient-rich diets and create jobs.

1/10 of the land area of a traditional water treatment facility. Some additional benefits, he noted, are that it emits no odour, makes very little noise, and eliminates almost all impact on oceans and fisheries. Mr. Linton conceded that the system requires power to run, which increases the operating costs where electricity is scarce or expensive.

Dr. Goreau provided a second presentation to expand on the benefits of Biorock technology for SIDS. He explained the dire situation of coral reefs in a changing climate. Since the 1990s, he explained, global temperatures have been in the upper range of predictions of the IPCC and that the changes will accelerate, taking thousands of years to see the full effects of any reversal. He added that the current agreements could help decrease the rate of *increase* of emissions to the atmosphere but that they do not actually decrease the overall levels of CO_2.

He explained that Biorock can be built for a fraction of the cost of retaining walls and it is longer-lasting because it cements itself to the ground. He provided an example of a serious erosion problem site in the Maldives, where retaining walls were failing to sustain the sand, trees and buildings. Dr. Goreau showed pictures of the site over time after a Biorock structure was

continued on Page 4

Identifying New Technologies for Sustainable Development in Small Island Developing States (cont.)

continued from Page 3

built to absorb the impact of the waves. The pictures showed that the beach had grown 50 feet within a few years and that a highly successful coral reef was formed (with survival rates 50 times higher than surrounding coral). Dr. Goreau explained that the system can be operated at a very low cost, roughly equivalent to the cost of electricity for outdoor lighting at a hotel. Dr. Goreau concluded that there is now a way to grow coastal defenses, and that they can be in place faster than the rate of sea level rise.

Mr. Jeff Rose, Executive Director of the Fully Belly Project, explained the rationale for his project to facilitate peanut shelling. He explained that in over 100 countries half a billion people rely on peanuts as their primary source of protein. Women and children in Africa spend approximately 4 billion hours hand-shelling peanuts. He demonstrated a universal nut-shelling device which can shell 125 lbs of peanuts/hour. He added that it is also capable of shelling shea, pine nuts, jatropha, neem and coffee beans. The unit can be made for $75 to $125 depending on the cost of local materials and can last for up to 25 years with good maintenance. He explained that given its capacity, the unit can provide shelling services for entire communities and can be developed as a micro-enterprise. He also presented photos of a larger, pedal-powered model which includes a winnower to separate the seed from the chaff. He added that there are two units operational in Haiti and that the Fully Belly Project is working with USAID to offer the device in more parts of the world.

Mr. Rose went on to describe the many benefits of the peanuts and of the project. Peanuts, he explained, are an excellent source of protein, they are easily stored, preserved or transported as peanut butter, they can prevent malnutrition, including for AIDS patients, and they improve soil by fixing nitrogen. The nut-shelling device, he added, does not require fuel or electricity, is very inexpensive, and by saving time would allow more children to attend school, and women to increase their income. Mr. Rose concluded by saying that it is an open source technology and they are looking for a mass manufacturer to help lower costs.

Mr. Ainiwaer Almasi opened his presentation by introducing the concept of Terra Preta, ancient Amazonian technique of applying carbon to soil to increase its fertility and to store carbon. This 2000 year old soil experiment, he explained, has recently been rediscovered as the best way to sequester carbon. He showed a map of 20 hectare, man-made plots along the Amazon River, dating from as early as 800 BC, where the soil yield three times the crop yields of surrounding soils. He explained that the soils are highly valued for their fertility and showed photos of them being mined for sale as potting soil.

He then outlined the carbon sequestration potential of the soil, noting that 2500 gigatons of carbon are stored in the soil, about four times as much as atmospheric carbon and approximately equal to global forest biomass. He added that the addition of charcoal to soil can store carbon for hundreds of millions of years, unlike forests, which do so only temporarily. He emphasized that this method of carbon capture should be recognized for carbon credits.

Mr. Day explains that we need to support the rural poor to become the 'new sustainable affluent'

Mr. Alimasi compared the charcoal sequestration approach to conventional carbon capture and storage (CCS) methods, arguing that CCS is expensive ($20-25/ tCO_2) and slow but does not reverse CO_2 buildup in the atmosphere. He outlined the direct benefits of applying charcoal to soil, including: dramatic increase in crop yields (up to 266%), increase in food security and decrease in rural poverty, reductions in fertilizer use, soil erosion and degradation, decreased desertification, reduced release of methane and nitrogen from soil, and increased above and below ground biomass growth and carbon storage. He showed several photos demonstrating increased fertility from charcoal experiments.

Mr. Alimsai concluded that charcoal presents an enormous potential for sequestration and that by increasing global soil char levels by only 8%, from 0.5% by weight to 0.54%, the excess of carbon dioxide in the atmosphere would be removed. He added that it is a low-tech, cost-effective way to mitigate climate change and to prevent/reverse

Mr. Alimasi demonstrates the value of applying carbon to soil to increase fertility and to capture carbon.

desertification in a massive, permanent carbon sink.

Mr. Danny Day, President of EPRIDA Inc, introduced his organization as a for-profit social purpose enterprise with non-profit ownership, a private research partner providing in-kind and commercial support for research developing emissions reductions technologies. He expanded upon the research presented by Mr. Alimasi, stating that small farms can reverse global warming while improving their crop land. He added that the challenge is recognizing how to influence the behaviour of billions of people to take part in producing Terra Preta. He explained that this is possible by using projects that increase earning potential and stability for the poorest people, adopting technologies that retain profits at the local level which can be scaled in numbers rather than size.

Mr. Day presented the graph of rising CO_2 levels in the atmosphere, noting that with each year's growing season in the northern hemisphere, there is a significant decline in CO_2. He emphasized that this decline in CO_2 could be increased with greater fertility and biomass production. He presented a solution of a small-scale pyrolysis (heating in the absence of air) system that converts biomass into fuel and charcoal on a farm/ coop level. He went on to present the benefits of adding charcoal to soil to increase its water retention, soil bacteria, and nutrient storage properties. He presented research of varying qualities of charcoal produced from experimenting with differing sources of biomass. He also presented the significant profit potential for the bio-fuel that is produced by the system as a replacement for traditional oil and gas. In closing, Mr. Day presented a sustainable system for energy and agriculture where crops are converted to bio-fuels for transportation and electricity through pyrolysis. The bi-product of carbon is then applied to the soil to improve crop yields to feed the cycle. The irony, he indicated, is that those in rural poverty and most at risk from global warming are the ones we need to support to become the 'new sustainable affluent'.

Gratitude and Feedback!

This edition of the Partnership Wire commemorates the closing session of the CSD 15 Partnerships Fair activities as well as the conclusion of the CSD 14 – CSD 15 thematic cycle. As Head of the Partnerships Team, I would like to take this opportunity to express the deep appreciation of the CSD Partnerships Team for the valuable participation of all distinguished panelists in our interactive discussion sessions and the partnerships representatives at the information desks during CSD 14, the IPM and this CSD 15 session. We sincerely praise the tireless commitment and enduring enthusiasm of the CSD Partnerships partners and practitioners within this thematic cycle as well as the tangible contributions to the implementation of sustainable development that these innovative initiatives are making. I also like to pay tribute and express my appreciation to the CSD participants that attended our sessions playing a vibrant and significant role in generating a meaningful exchange of views and ideas. The constructive dialogue generated greatly contributed to enhance our knowledge of the challenges, lessons learned and best practices of partnering to implement sustainable development.

As the CSD Secretariat continues to work on improving its on-line services, including the CSD Partnerships website features and the database functions, to facilitate the consideration of partnerships in CSD discussions as well as highlight the innovative contributions of CSD partnerships, we would like to encourage you to send us your feedback in order to improve the quality of our services. Please feel free to send your comments at beyondwssd@un.org

Patricia Chaves, Head of the Partnerships Team , CSD Secretariat

CSD-15 Partnerships Fair Information Desks Tuesday, May 8

Generation IV International Forum

REEEP—Renewable Energy and Energy Efficiency Partnership

Global Village Energy Partnership

REN 21– Renewable Energy Policy Network for the 21st Century